

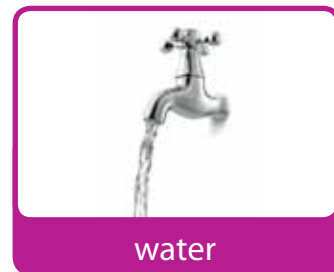
# PROJECT REFERENCE

## UNIT 1

### AN AIR PRESSURE EXPERIMENT

You can't see air pressure, but you can see how it works.

Materials:



#### STEP

- Fill your bottle with water. Put on the cap and close it tightly.
- Push the pin into the bottle.
- Pull it out.
- Press the bottle with your hand.
- Now, take the cap off the top of the bottle.

Even when you poke a hole in the bottle, water doesn't come out. This is because air pushes against the hole and keeps the water inside. But when you press it, you apply pressure to the bottle, and the water comes out. When you take the cap off, air comes in through the top of the bottle. It pushes the water down, and the water comes out through the hole.

UNIT  
3

## MAKE A CONVECTION SNAKE

You can make a moving snake using a convection current in the air.

Materials:



a sheet of paper  
cut as a spiral



yarn (15 cm)



a table lamp



clear tape

**STEP**

- Attach one end of a piece of yarn to the middle of the paper spiral with clear tape.
- Put the table lamp on the floor. Turn it on.
- Take the other end of the yarn. Hang the paper spiral 10 cm above the table lamp.

Warm air is less dense and lighter than cold air. The heated air near the lamp rises and the colder air moves down. This process is called a convection current. This air movement makes the paper turn round and round.

# PROJECT REFERENCE

## UNIT 7

### TOOTHPICK SURFACE TENSION EXPERIMENT

Let's see what happens when surface tension breaks.

Materials:



#### STEP

- a. Carefully place the toothpicks on the water. If you can, get them to form a triangle.
- b. Add a drop of liquid soap in the middle of the triangle.

On the surface of the water, where you form a triangle using toothpicks, the water molecules are tightly pulled together. We call this surface tension. When you add liquid soap, the surface tension breaks, and the water molecules move. The triangle of toothpicks breaks apart, too.

UNIT  
11

## HOW CAN YOU FIX THE CRUSHED BALL?

Let's see how the volume of a gas changes.

Materials:



**STEP**

- Crush the table tennis ball.
- Pour boiling water into the cup and put the ball in it.
- Use the spoon to press the ball under the hot water.





As air gets warm, the air molecules have more energy and take up more space. When you put the crushed ball in the boiling water, it gets bigger and returns to its original shape. You can repair other balls, such as basketballs, with the same method.

# PROJECT REFERENCE

## UNIT 12

### THE VOLUME OF GASES IN OUR DAILY LIFE

You can see more examples of gases changing volume with temperature in everyday life. See the chart below.

Volume increases		Yeast in bread releases carbon dioxide. In the hot oven, the carbon dioxide bubbles expand and make the bread spongy.
		Spray cans have warnings not to store them at high temperatures. This is because the air molecules inside the can will expand and cause the can to burst or explode.
Volume decreases		A basketball shrinks in size when the temperature decreases. However, it gets its shape back when you bring it to a warm room again.
		A balloon gets smaller when there's a change in the surrounding temperature. If you bring the balloon outside on a cold day, it gets smaller.

UNIT  
**13**

## WHAT DOES THE STEM TASTE LIKE?

Let's see how stems carry water to leaves or flowers by doing this experiment.

Materials:



**STEP**

- Cut two celery stems to 12 cm long. Dissolve salt into water in one of the bowls. Dissolve sugar into water in the other bowl.
- Put one celery stem in each bowl. Leave the celery the whole night in the different bowls.
- The next morning, take one stem out of a bowl. Bite it. Do the same with the other stem.

A stem carries water, minerals, and nutrients from the roots to the leaves. In this experiment, the salty water and the sugary water move up the stems. You can taste the salt and sugar because the stems contain the water.

# PROJECT REFERENCE

## UNIT 15

### MAKE A PINWHEEL

Let's make a colorful pinwheel and play together!

Materials:



#### STEP

- Draw an X from corner to corner on the paper and cut half of each section.
- Poke a hole in the corners with the push pin. Fold the corner to the middle.
- Repeat for all four sides. Pin the push pin in the center.
- Put a small bead on the push pin, behind the pinwheel. Stick the pin to the bamboo stick.

Pinwheels turn because of wind. The cups in the blades capture the wind, which pushes the blades. When you want to change the direction the pinwheel turns, just fold the corners in the opposite direction. In addition, you can make the pinwheel turn faster or slower by changing the amount of wind that goes through it.